

AIST Technology Roadmaps —

Strategic Planning Process and Investment Themes

Karen Moe ESTO TST May 8, 2001

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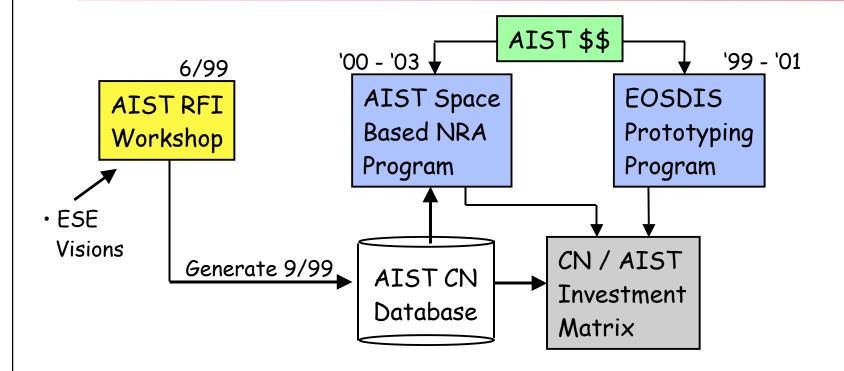


AIST Highlights

- AIST Request for Information and Workshop June 1999
 - Produced a broad sweep of relevant information technologies for ESE
 - Results organized into AIST Capability/Need database; RFI report, CN dbms available via FSTO web site
- AIST Space-based Technologies NRA Selections April 2000
 - By Dec. 2000, all awards in progress; Abstracts, progress reports available
- AIST Technology Projections Workshop August 2000
 - Results fed key investment themes; Workshop proceedings available
- AIST Key Ground and Space-based Investment Themes
 - Mapped investment themes to CN dbms to weight technology needs
 - Mapped baseline measurement profile series ("Easton Report" BMPS) to CN dbms to weight technology needs
 - Mapped NRA and Prototyping investments to the CN dbms to identify initial technology investment gaps



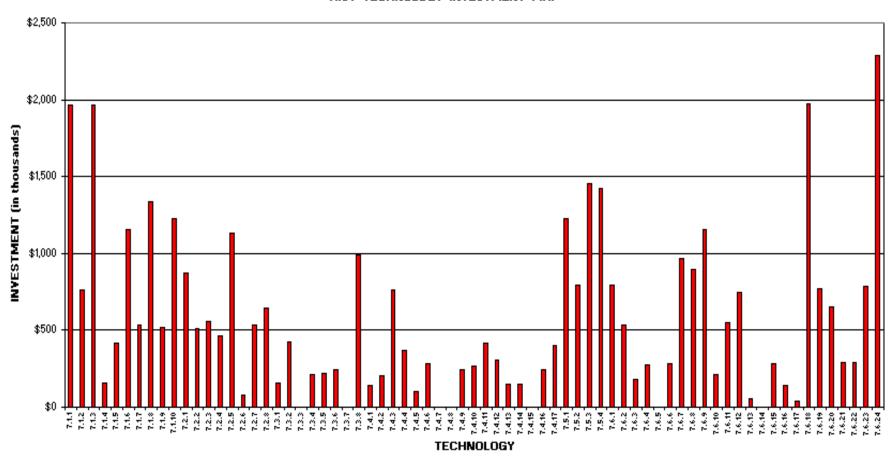
AIST Strategic Planning Process - 1st Cycle





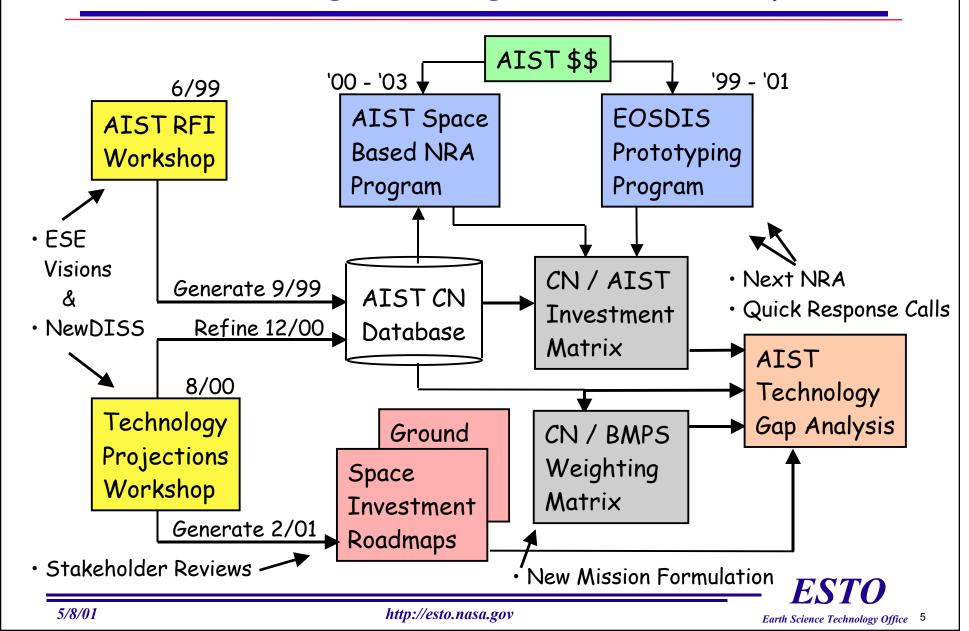
AIST Investment Matrix

AIST TECHNOLOGY INVESTMENT MAP





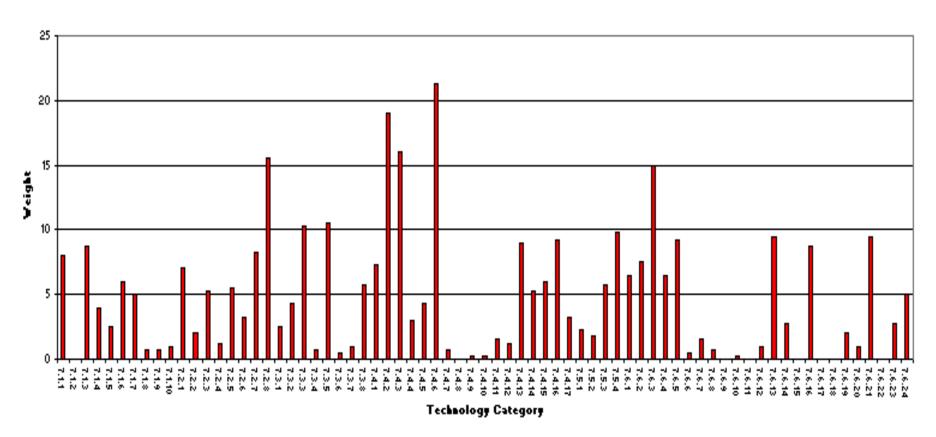
AIST Strategic Planning Process - 2nd Cycle





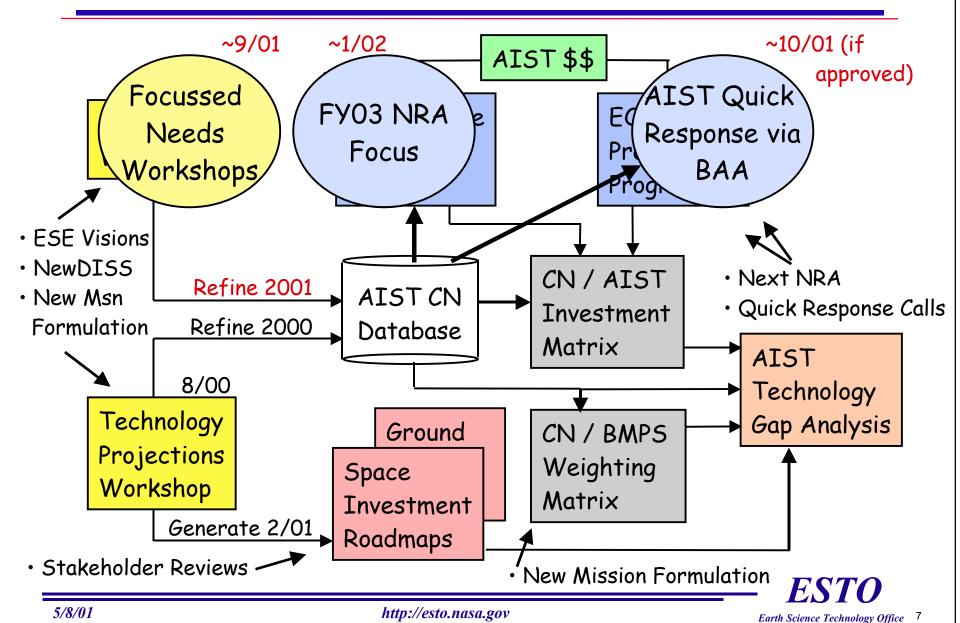
AIST CN / BMPS Matrix

BMPS Missions Technology Map





AIST Strategic Planning Process - 3rd Cycle





AIST Road Map Activities

- AIST Technology Projections Workshop held August 2000
 - Purpose was to identify relevant IT technologies that are the most important for ESE to fund
 - Workshop structured to develop informed projections for 8 critical technology areas:
 - Large Archival Storage
 - Data Discovery
 - Data Exploitation
 - Data Architectures

- Space Based Computing Architecture
- Data Compression and Storage
- Intelligent Platform and Sensor Control
- High Speed Data Delivery

Ground-based Technologies

Space-based Technologies

- Technical and ESE program specialists brought together to assess scope of projections, and technology "need" summary (some performance, cost and schedule data collected)

AIST Key "Ground" Investment Themes (v. 4/01)

2006

2007

2008

2009

2005

2011

2010

2003

2004

2002

2001

Earth Science Data & Research Code for Basic Earth "Living" Data Effective Knowledge Services Limited Semantic Science Lineage Representation Representation Extraction, Information Technique 'Representation **OGC** Participation **Earth Science** Interoperable Independent Component-based Component-based Data & Tool Sets Framework with Pilot Tool Framework with Services Comprehensive Open Tool Sets Sets **Framework** Knowledge Automatic Change Detection & Extraction Research Code for Pilot Extraction Tool Set Task Initiation for Sensor Webs Limited Knowledge Extraction / Change Detection Information Access and Real-time Event Adaptive / Customized Independent Partner on Subscriptions/ URN Recognition & Subscription / Advertising **Delivery OGC-WMT** participation Technology Products on Services Demand **High-Performance Evolvable** Proprietary FSMS Swath High-Advanced Media Archives **DBMS** Performance **Benchmarks** ANSI MS66 Metadata Evolvable FSMS Interoperability Standard **Data Product** Planning & Stand-Alone Dynamic Representation of **Unified Scheduling** Resource Manager Learns and Tools Resource Capabilities Improves on Performance **Scheduling** Architecture (archives, processors, **Estimates** networks) (predict & manage)

AIST Key "Space" Investment Themes (v. 4/01)

2006

2007

2008

2009

2010

2011

2005

2002

2001

2003

2004

High Data Rate Communication X-Band Ka-Band Optical **Technologies Technologies Technologies** Satellite IP **Network** Onboard TCP IP over Sat w/ IP Networks **TDRSS** Flight Qual IP to the Over Routers & larger network on Satellites Supports End-to-end Instrument Satellite Switches Routable Nets ΙP Microprocessor, **Board and Bus FPGA** Rad Hardened 3 - 4 GIPS High Hiah **Technology** Tool Sandia Performance Bandwidth Processor Sets Pentium Boards (100s Optical Bus MIPS) (Gbps Lossless & **Lossy Data** 20 Msps **JPEG** 80 Msps ROI 80 Msps High Performance Feature 220 Msps ~ 2:1 Comp Lossy Identification for Compression 2:1 Comp Lossy 3:1 Comp 5:1 Comp Ratio Comp Ratio Comp Ratio **Preferential Compression** Ratio **Onboard Storage** Volumetric/Optical Solid Magnetic/Optical Volumetric/Optical Volumetric/Optical **Architecture** State Hybrid Planar 1st Generation 2nd Generation 3rd Generation 0.002 bitsum³ 0.05 bits/µm³ 0.1 bits/µm³ 0.2 bits/µm³ 300 Mbits/sec 500 Mbits/sec 1 Gbits/sec 2 Gbits/sec **Intelligent Platform & Sensor Control** Remote Agent Arch **Experimental Arch for Experimental Reference Arch** Agent-based Reference Arch for single multiple autonomous for multiple autonomous for multiple autonomous autonomous spacecraft (~3) spacecraft (~5) spacecraft (~50) spacecraft **Navigation** Onboard GPS Differential GPS Self-calibrating High precision control **Technologies** tracking and Lidar Systems nav systems of cluster satellites



Status

- AIST technology investment activities have resulted in the following products (available at http://esto.gsfc.nasa.gov):
 - RFI technology survey report (1999)
 - AIST technology projections workshop report and charts (2000)
 - AIST NRA and Prototyping technical progress reports
 - Capability / Needs database (1999 & 2000 refinement)
 - CN weighting and investment matrices (2001)
 - First draft AIST themes for technology investments (2001)
- AIST activities currently in process
 - Technology Gap Analysis
 - Recommendation for BAA procurement strategy to complement NRA



Next Steps

- Continue analysis of sister technology programs for ESE related IT than we can leverage
 - Cross Enterprise Technology Development Program (CETDP)
 - Intelligent Systems (IS)
 - HPCC Earth and Space Science (ESS) Round 3
 - SBIR/STTR, Space Operations Management Office (SOMO) Technology Program, etc.,
- Identify / prioritize current technology gaps
- Review AIST investment themes with stakeholders
- Review strategy and procurement approach with stakeholders
- Get HQ endorsement of strategy and procurement approach to initiate BAA for quick response procurements
- Prepare for FY03 NRA solicitation